

WHAT IS CLAIMED IS:

1                   1.       A reactor for growing a gallium containing single crystal,  
2 comprising:  
3                   a multi-zone heater;  
4                   a growth zone, wherein said multi-zone heater maintains at least one  
5 substrate within said growth zone at a growth temperature greater than 850° C;  
6                   an extended gallium source within a multi-zone gallium source zone,  
7 wherein said multi-zone heater maintains a first portion of said extended gallium source  
8 at a first temperature greater than 450° C while simultaneously maintaining a second  
9 portion of said extended gallium source at a second temperature in the range of 30° C to  
10 100° C, wherein upon reaction initiation said second portion comprises at least 50 percent  
11 of said extended gallium source;  
12                  a halide reaction gas source coupled to said multi-zone gallium source  
13 zone;  
14                  an inert gas source coupled to said multi-zone gallium source zone to  
15 transport a first reaction product from said multi-zone gallium source zone to said growth  
16 zone; and  
17                  a reaction gas source coupled to said growth zone.

1                   2.       The reactor of claim 1, wherein upon reaction initiation said second  
2 portion comprises at least 90 percent of said extended gallium source.

1                   3.       The reactor of claim 1, wherein said second temperature is in the  
2 range of 30° C to 40° C.

1                   4.       The reactor of claim 1, further comprising a first aluminum source  
2 zone, wherein said halide reaction gas source and said inert gas source are coupled to said  
3 first aluminum source zone, and wherein said multi-zone heater maintains a first  
4 aluminum source within said first aluminum source zone to a third temperature greater  
5 than 700° C.

1                   5.       The reactor of claim 4, further comprising a second aluminum  
2 source zone, wherein said halide reaction gas source and said inert gas source are coupled

3 to said second aluminum source zone, and wherein said multi-zone heater maintains a  
4 second aluminum source within said second aluminum source zone to a fourth greater  
5 than 700° C.

1 6. The reactor of claim 1, wherein said multi-zone heater is a multi-  
2 zone resistive heater furnace.

1 7. The reactor of claim 1, further comprising an acceptor impurity  
2 source zone, wherein said inert gas source is coupled to said acceptor impurity source  
3 zone, and wherein said multi-zone heater maintains an acceptor impurity within said  
4 acceptor impurity source zone at a third temperature.

1 8. The reactor of claim 1, further comprising a donor impurity source  
2 zone, wherein said inert gas source is coupled to said donor impurity source zone, and  
3 wherein said multi-zone heater maintains a donor impurity within said donor impurity  
4 source zone at a third temperature.

1 9. The reactor of claim 1, further comprising means for transferring  
2 said at least one substrate within said growth zone to a second growth zone.

1 10. The reactor of claim 9, wherein said multi-zone heater maintains  
2 said at least one substrate within said second growth zone at a third temperature.

1 11. The reactor of claim 10, wherein said growth temperature is in the  
2 range of 1,000° C to 1,100° C and wherein said third temperature is in the range of  
3 850° C to 1,000° C.

1 12. The reactor of claim 1, wherein said halide gas source supplies HCl  
2 gas.

1 13. The reactor of claim 1, wherein said reaction gas source supplies  
2 ammonia gas.